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November 20, 1998

Mr. Michael Bellot
U.S. Environmental Protection Agency
Water Management Division
Region V
77 West Jackson Boulevard
Chicago, IL 60604-3590

Re: Waukegan Manufactured Gas and Coke Plant Site

Dear Mr. Bellot:

The attached tables and figures summarize the results from the September 15–18, 1998, surface water sampling near the WCP site. The sampling was conducted in accordance with the Work Plan transmitted to you on June 5, 1998, with the addition of the SW-6N sampling location.

Sampling Data

The sampling data are summarized, both field and laboratory, in Tables 1 and 2. Quality control sample data are in Table 3. A separate summary of the field data is also attached, showing field observations and the order of sampling. Winds were 5 to 15 miles per hour (mph) from the northeast on September 15 when only harbor sampling was performed. Winds were light and variable (less than 5 mph) on September 16, were from the north at 0 to 5 mph on September 17, and were variable at 0 to 5 mph on September 18.

The laboratory data are presented on figures showing the sampling locations. Figures 1 through 3 show the sample locations in the harbor and along the lake front for ammonia, arsenic, and total phenols. Figures 4 and 5 show the surface water velocity measurements along the lake front and in the harbor (Figure 4) and at the transect sampling area (Figure 5). Figures 6 through 12 show sampling results in detail for the transect area and harbor. The transect area figures include the 1996–1997 groundwater data and groundwater contours from the FS.

Quality Control

The dissolved (filtered) arsenic sample concentrations are reported to be somewhat higher than the arsenic sample concentrations for many of the samples where arsenic was reported. However, the reported dissolved and total arsenic concentrations are similar enough that the difference is not material.

Data Analysis

Water quality standards for comparison with the sample data are included in Tables 1 and 2. No harbor or breakwater area samples exceeded Lake Michigan Basin water quality standards. No near-shore samples from Lake Michigan exceeded the open waters standards for Lake Michigan for arsenic or phenols.

Exceedances of the open waters standard for ammonia (0.020 mg/L) were reported for one background sample and one of the transect samples. Background sample SW-5NB, collected off Illinois Beach State Park, was reported to have an ammonia concentration of 0.06 mg/L. Transect sample SWT3-50B, the sample 50 feet from shore on the southernmost transect, was reported to have an ammonia concentration of 0.07 mg/L. All other transect samples were at or below the

surface water standard. The average ammonia concentration for the 30 transect samples was 0.009 mg/L (using 0.005 mg/L, one-half the detection limit, for nondetects), substantially below the open waters standard. A statistical analysis of the September ammonia data, comparing the background data to the transect data, found the two populations are essentially the same, which means that the September ammonia results for the transects are about the same as from the background samples.

Please call me if you have any comments on this data.

Sincerely,

James R. Langseth

JRL/cnl
Enclosure
c: Jerry Willman, IEPA
Bob Mosher, IEPA
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Philip R. Smith, CH2M Hill
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Table 1
1998 Surface Water Samples
Lake Michigan Near-Shore Open Waters
Water Quality Data

	Lake Michigan Open Water Water Quality Standards	SW-2NA	SW-2NB	SW-3NA	SW-3NB	SW-4NA	SW-4NB
		09/18/1998	09/18/1998	09/18/1998	09/18/1998	09/16/1998	09/16/1998
Depth (ft.)		2.7	2.7	4.8	4.8	9.0	9.0
Nitrogen, ammonia as N (mg/L)	0.02	0.02	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic, Total (mg/L)	0.05	0.0093	0.0058	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Arsenic, dissolved (mg/L)		0.012	0.0065	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Total Phenolic Compounds (mg/L)	0.001	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	0.45	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
m-Cresol (mg/L)		--	--	--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.012	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Temperature, degrees C		22.5	22.5	23	22.9	20.3	20.3
Dissolved oxygen (mg/L)		8.21	8.25	9.36	9.49	--	--
pH, standard units		7.45	7.42	8.05	8.13	7.38	7.47
Redox (oxidation potential), mV		122	119	105	101	--	--
Specific Conductance umhos@ 25oC		726	880	288	288	296	305

Table 1 (cont.)
1998 Surface Water Samples
Lake Michigan Near-Shore Open Waters
Water Quality Data

	Lake Michigan Open Water Water Quality Standards	SW-5NA	SW-5NB	SW-6NA	SW-6NB	SW-1SA	SW-1SB
		09/16/1998	09/16/1998	09/18/1998	09/18/1998	09/18/1998	09/18/1998
Depth (ft.)		6.0	6.0	2.8	2.8	6.4	6.4
Nitrogen, ammonia as N (mg/L)	0.02	0.01 U	0.06	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic, Total (mg/L)	0.05	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Arsenic, dissolved (mg/L)		0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Total Phenolic Compounds (mg/L)	0.001	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	0.45	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
m-Cresol (mg/L)		--	--	--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.012	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Temperature, degrees C		20.7	20.8	29.1	29.3	22.6	22.6
Dissolved oxygen (mg/L)		--	--	7.81	7.76	8.66	8.71
pH, standard units		7.24	7.33	8.11	8.13	7.83	7.95
Redox (oxidation potential), mV		--	--	89	86	112	107
Specific Conductance umhos@ 25oC		294	305	294	295	291	292

Table 1 (cont.)
1998 Surface Water Samples
Lake Michigan Near-Shore Open Waters
Water Quality Data

	Lake Michigan Open Water Water Quality Standards	SWT1-50A	SWT1-50B	SWT1-100A	SWT1-100B
		09/17/1998	09/17/1998	09/17/1998	09/17/1998
Depth (ft.)		3.1	3.1	3.1	3.1
Nitrogen, ammonia as N (mg/L)	0.02	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic, Total (mg/L)	0.05	0.0049	0.0034	0.0020 U	0.0032
Arsenic, dissolved (mg/L)		0.0035	0.0022	0.0020 U	0.0021
Total Phenolic Compounds (mg/L)	0.001	0.01 U	0.01 U	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	0.45	0.010 U	0.010 U	0.010 U	0.010 U
m-Cresol (mg/L)		--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.012	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Temperature, degrees C		21.4	22.0	20.7	20.8
Dissolved oxygen (mg/L)		--	--	--	--
pH, standard units		7.42	7.32	7.51	7.49
Redox (oxidation potential), mV		--	--	--	--
Specific Conductance umhos@ 25oC		488	631	338	401

Table 1 (cont.)
1998 Surface Water Samples
Lake Michigan Near-Shore Open Waters
Water Quality Data

	Lake Michigan Open Water Water Quality Standards	SWT1-150A	SWT1-150B	SWT1-200A	SWT1-200B	SWT1-250A	SWT1-250B
		09/17/1998	09/17/1998	09/16/1998	09/16/1998	09/16/1998	09/16/1998
Depth (ft.)		2.8	2.8	4.5	4.5	7.1	7.1
Nitrogen, ammonia as N (mg/L)	0.02	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic, Total (mg/L)	0.05	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0042	0.003
Arsenic, dissolved (mg/L)		0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Total Phenolic Compounds (mg/L)	0.001	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	0.45	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
m-Cresol (mg/L)		--	--	--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.012	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Temperature, degrees C		20.5	20.7	21.2	21.2	20.9	21.1
Dissolved oxygen (mg/L)		--	--	7.89	7.98	7.96	7.92
pH, standard units		7.34	7.40	7.48	7.49	7.35	7.48
Redox (oxidation potential), mV		--	--	--	--	141	--
Specific Conductance umhos@ 25oC		344	334	294	293	300	307

Table 1 (cont.)
1998 Surface Water Samples
Lake Michigan Near-Shore Open Waters
Water Quality Data

	Lake Michigan Open Water Water Quality Standards	SWT2-50A	SWT2-50B	SWT2-100A	SWT2-100B	SWT2-150A	SWT2-150B
		09/17/1998	09/17/1998	09/17/1998	09/17/1998	09/17/1998	09/17/1998
Depth (ft.)		2.4	2.4	2.8	2.8	3.0	3.0
Nitrogen, ammonia as N (mg/L)	0.02	0.02	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic, Total (mg/L)	0.05	0.0047	0.0032	0.0036	0.004	0.0031	0.0032
Arsenic, dissolved (mg/L)		0.0042	0.003	0.0039	0.0035	0.0032	0.0033
Total Phenolic Compounds (mg/L)	0.001	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	0.45	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
m-Cresol (mg/L)		--	--	--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.012	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Temperature, degrees C		22.8	23.2	22.1	22.4	23.6	23.7
Dissolved oxygen (mg/L)		--	7.80	--	--	8.08	8.03
pH, standard units		7.29	7.32	7.27	7.35	7.43	7.56
Redox (oxidation potential), mV		--	--	--	--	--	--
Specific Conductance umhos@ 25oC		621	667	538	550	538	530

Table 1 (cont.)
1998 Surface Water Samples
Lake Michigan Near-Shore Open Waters
Water Quality Data

	Lake Michigan Open Water Water Quality Standards	SWT2-200A	SWT2-200B	SWT2-250A	SWT2-250B	SWT3-50A	SWT3-50B
		09/17/1998	09/17/1998	09/16/1998	09/16/1998	09/17/1998	09/17/1998
Depth (ft.)		3.7	3.7	4.0	4.0	1.5	1.5
Nitrogen, ammonia as N (mg/L)	0.02	0.01 U	0.01 U	0.01 U	0.01 U	0.02	0.07
Arsenic, Total (mg/L)	0.05	0.0029	0.0020 U	0.0020 U	0.0020 U	0.0039	0.0042
Arsenic, dissolved (mg/L)		0.0025	0.0023	0.0020 U	0.0020 U	0.0034	0.0046
Total Phenolic Compounds (mg/L)	0.001	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	0.45	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
m-Cresol (mg/L)		--	--	--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.012	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Temperature, degrees C		23.3	23.0	22.0	22.4	24.9	24.6
Dissolved oxygen (mg/L)		8.21	8.25	--	--	8.27	8.32
pH, standard units		7.49	7.68	7.45	7.57	7.48	7.52
Redox (oxidation potential), mV		--	--	--	--	--	--
Specific Conductance umhos@ 25oC		875	357	347	321	590	566

Table 1 (cont.)
1998 Surface Water Samples
Lake Michigan Near-Shore Open Waters
Water Quality Data

	Lake Michigan Open Water Water Quality Standards	SWT3-100A	SWT3-100B	SWT3-150A	SWT3-150B	SWT3-200A	SWT3-200B
		09/17/1998	09/17/1998	09/18/1998	09/18/1998	09/18/1998	09/18/1998
Depth (ft.)		1.9	1.9	2.8	2.8	3.5	3.5
Nitrogen, ammonia as N (mg/L)	0.02	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic, Total (mg/L)	0.05	0.0035	0.0034	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Arsenic, dissolved (mg/L)		0.0036	0.0031	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Total Phenolic Compounds (mg/L)	0.001	0.02	0.01 U	0.01 U	0.07	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	0.45	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
m-Cresol (mg/L)		--	--	--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.012	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Temperature, degrees C		24.7	24.6	22	22.2	21.6	21.7
Dissolved oxygen (mg/L)		8.40	8.39	8.22	8.15	8.32	8.06
pH, standard units		7.30	7.45	7.83	7.95	7.80	7.88
Redox (oxidation potential), mV		--	--	119	112	120	125
Specific Conductance umhos@ 25oC		550	538	320	320	338	333

Table 1 (cont.)
1998 Surface Water Samples
Lake Michigan Near-Shore Open Waters
Water Quality Data

	Lake Michigan Open Water Water Quality Standards	SWT3-250A	SWT3-250B
		09/18/1998	09/18/1998
Depth (ft.)		5.3	5.3
Nitrogen, ammonia as N (mg/L)	0.02	0.02	0.01
Arsenic, Total (mg/L)	0.05	0.0020 U	0.0020 U
Arsenic, dissolved (mg/L)		0.0020 U	0.0020 U
Total Phenolic Compounds (mg/L)	0.001	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	0.45	0.010 U	0.010 U
m-Cresol (mg/L)		--	--
o-Cresol (mg/L)		0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U
Benzene (mg/L)	0.012	0.0010 U	0.0010 U
Temperature, degrees C		21.3	21.4
Dissolved oxygen (mg/L)		8.05	8.19
pH, standard units		7.56	7.87
Redox (oxidation potential), mV		146	121
Specific Conductance umhos@ 25oC		342	341

Table 2
1998 Surface Water Samples
Harbor and Breakwater Areas
Water Quality Data

	Lake Michigan Basin Water Water Quality Standards	SW-1NA	SW-1NB	H-1A	H-1B
		09/18/1998	09/18/1998	09/15/1998	09/15/1998
Depth (ft.)		2.8	2.8	28.0	28.0
Nitrogen, ammonia as N (mg/L)	15	0.01 U	0.01 U	0.04	0.02
Nitrogen, un-ionized ammonia as N (mg/L)	0.33 / 0.057			0.00005	0.00008
Arsenic, total (mg/L)	0.148	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Arsenic, dissolved (mg/L)		0.0020 U	0.0020 U	0.0020 U	0.0020 U
Total Phenolic Compounds (mg/L)	0.1	0.01 U	0.01 U	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	8.7	0.010 U	0.010 U	0.001 J	0.010 U
m-Cresol (mg/L)		--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.31	0.0010 U	0.0010 U	0.0077	0.0010 U
Temperature, degrees C		23.6	23.1	21.3	17.3
Dissolved oxygen (mg/L)		8.60	8.69	6.00	5.85
pH, standard units		7.77	7.72	6.41	6.97
Redox (oxidation potential), mV		106	103	130	160
Specific Conductance umhos@ 25oC		296	299	308	292

Note - As detailed in Section 302.535 - April through October Acute Standard for Un-ionized ammonia is 0.33 mg/L and the Chronic Standard is 0.057 mg/L.

Table 2 (cont.)
1998 Surface Water Samples
Harbor and Breakwater Areas
Water Quality Data

	Lake Michigan Basin Water Water Quality Standards	H-2A	H-2B	H-3A	H-3B
		09/15/1998	09/15/1998	09/16/1998	09/16/1998
Depth (ft.)		31.0	31.0	36.0	36.0
Nitrogen, ammonia as N (mg/L)	15	0.06	0.04	0.16	0.11
Nitrogen, un-ionized ammonia as N (mg/L)	0.33 / 0.057	0.00008	0.00007	0.00008	0.00006
Arsenic, total (mg/L)	0.148	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Arsenic, dissolved (mg/L)		0.0020 U	0.0020 U	0.0020 U	0.0020 U
Total Phenolic Compounds (mg/L)	0.1	0.01 U	0.01 U	0.01 U	0.01 U
Phenol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
2,4-Dimethylphenol (mg/L)	8.7	0.002 J	0.010 U	0.002 J	0.002 J
m-Cresol (mg/L)		--	--	--	--
o-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
p-Cresol (mg/L)		0.010 U	0.010 U	0.010 U	0.010 U
Benzene (mg/L)	0.31	0.0084	0.0053	0.0068	0.008
Temperature, degrees C		20.8	19.3	20.6	20.5
Dissolved oxygen (mg/L)		5.53	5.48	3.67	3.63
pH, standard units		6.39	6.58	5.98	6.01
Redox (oxidation potential), mV		115	114	--	--
Specific Conductance umhos@ 25oC		313	303	314	312

Note - As detailed in Section 302.535 - April through October Acute Standard for Un-ionized ammonia is 0.33 mg/L and the Chronic Standard is 0.057 mg/L.

Table 3
QC Samples
Blanks

	FB	TB	TB	TB
	09/18/1998	09/16/1998	09/17/1998	09/18/1998
Nitrogen, ammonia as N (mg/L)	0.01 U	--	--	--
Arsenic, total (mg/L)	0.002 U	--	--	--
Arsenic, dissolved (mg/L)	0.002 U	--	--	--
Total Phenolic Compounds (mg/L)	--	--	--	--
Phenol (mg/L)	--	--	--	--
2,4-Dimethylphenol (mg/L)	--	--	--	--
o-Cresol (mg/L)	--	--	--	--
p-Cresol (mg/L)	--	--	--	--
Benzene (mg/L)	0.0010 U	0.0010 U	0.0010 U	0.0010 U

Table 3 (cont.)
QC Samples
Blanks

	LB	LB	LB	LB	LB	LB	LB	LB
	09/15/1998	09/16/1998	09/17/1998	09/17/1998	09/17/1998	09/17/1998	09/18/1998	09/18/1998
Nitrogen, ammonia as N (mg/L)	--	--	--	--	--	--	0.01 U	--
Arsenic, total (mg/L)	--	0.002 U	--	--	0.002 U	0.002 U	--	0.002 U
Arsenic, dissolved (mg/L)	--	0.002 U	--	--	0.002 U	0.002 U	--	0.002 U
Total Phenolic Compounds (mg/L)	0.01 U	0.01 U	--	--	0.01 U	0.01 U	0.01 U	0.01 U
Phenol (mg/L)	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	--	0.010 U
2,4-Dimethylphenol (mg/L)	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	--	0.010 U
o-Cresol (mg/L)	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	--	0.010 U
p-Cresol (mg/L)	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	--	0.010 U
Benzene (mg/L)	0.0010 U	0.0010 U	--	--	0.0010 U	0.0010 U	--	--

Table 3 (cont.)
QC Samples
Duplicates

	SWT1-50B	SWT1-50B	RPD	SWT2-50B	SWT2-50B	RPD
	09/17/1998	09/17/1998		09/17/1998	09/17/1998	
Ammonia Nitrogen (mg/L)	0.01 U	0.01 U		0.01 U	0.01 U	
Arsenic, total (mg/L)	0.0034	0.0024	34	0.0036	0.0032	12
Arsenic, dissolved (mg/L)	0.0022	0.002 U		0.0026	0.003	14
Total Phenolic Compounds (mg/L)	0.01 U	0.01 U		0.01 U	0.01 U	
Phenol (mg/L)	0.010 U	0.010 U		0.010 U	0.010 U	
2,4-Dimethylphenol (mg/L)	0.010 U	0.010 U		0.010 U	0.010 U	
m-Cresol (mg/L)						
o-Cresol (mg/L)	0.010 U	0.010 U		0.010 U	0.010 U	
p-Cresol (mg/L)	0.010 U	0.010 U		0.010 U	0.010 U	
Benzene (mg/L)	0.0010 U	0.0010 U		0.0010 U	0.0010 U	

Table 3 (cont.)
QC Samples
Duplicates

	SWT3-50B	SWT3-50B	RPD	SW-1SB	SW-1SB	RPD
	09/17/1998	09/17/1998		09/18/1998	09/18/1998	
Ammonia Nitrogen (mg/L)	0.05	0.07	33	0.01 U	0.01 U	
Arsenic, total (mg/L)	0.0047	0.0042	11	0.002 U	0.002 U	
Arsenic, dissolved (mg/L)	0.0042	0.0046	9.1	0.002 U	0.002 U	
Total Phenolic Compounds (mg/L)	0.01 U	0.01 U		0.01	0.01 U	
Phenol (mg/L)	0.010 U	0.010 U		0.010 U	--	
2,4-Dimethylphenol (mg/L)	0.010 U	0.010 U		0.010 U	--	
m-Cresol (mg/L)						
o-Cresol (mg/L)	0.010 U	0.010 U		0.010 U	--	
p-Cresol (mg/L)	0.010 U	0.010 U		0.010 U	--	
Benzene (mg/L)	0.0010 U	0.0010 U		0.0010 U	0.0010 U	

Data Qualifiers and Footnotes

Waukegan Lake & Harbor
September 1998 Water Quality Data

--	Not analyzed.
U	Not detected.
J	Reported value is less than the stated laboratory quantitiation limit and is considered an estimated value.

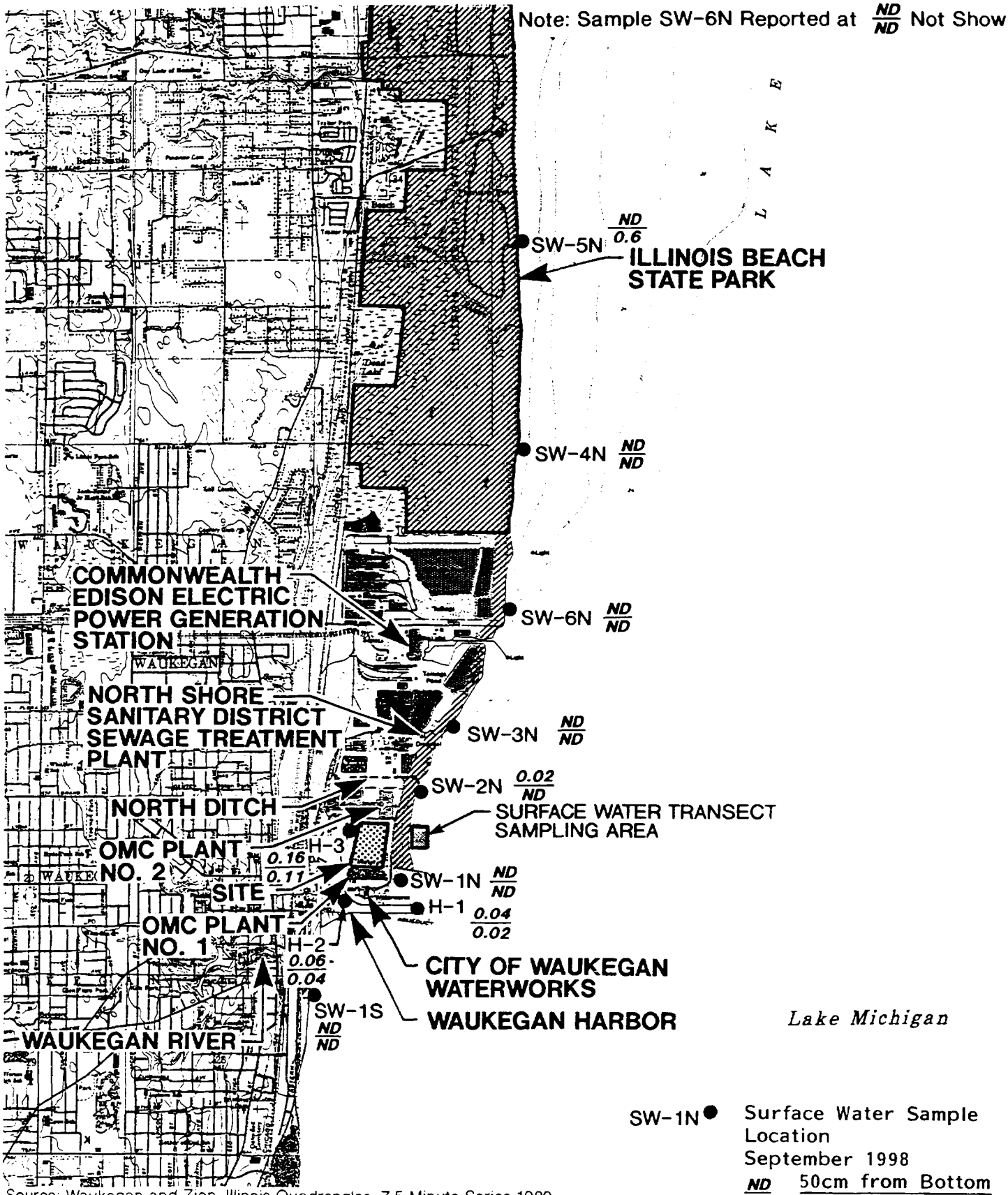
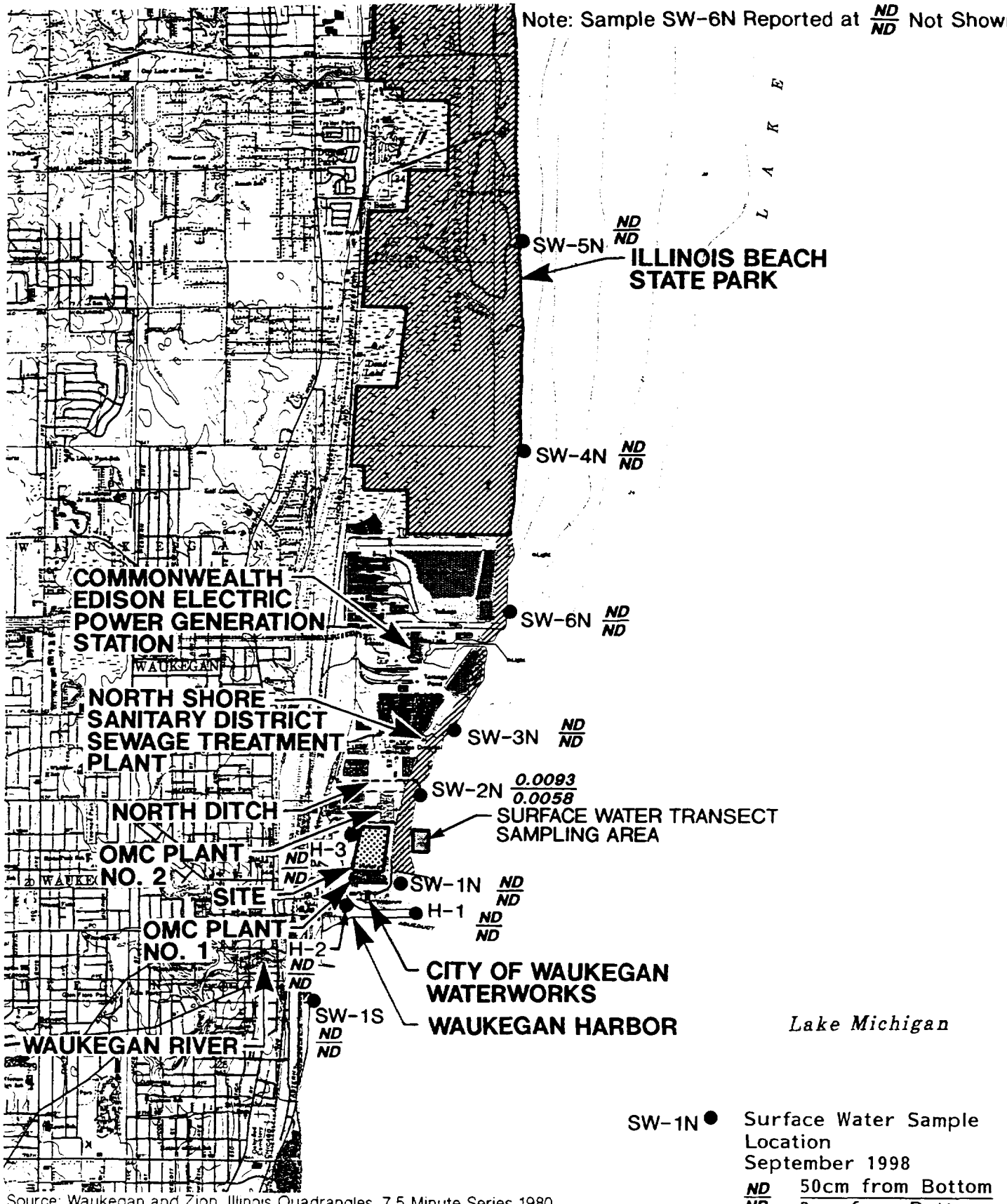


Figure 1

AMMONIA CONCENTRATIONS IN SURFACE WATER
(Concentrations in mg/L)
Waukegan Manufactured Gas & Coke Plant Site



Source: Waukegan and Zion, Illinois Quadrangles, 7.5 Minute Series, 1980.

Figure 2

TOTAL ARSENIC CONCENTRATIONS IN SURFACE WATER
(Concentrations in mg/L)
Waukegan Manufactured Gas & Coke Plant Site

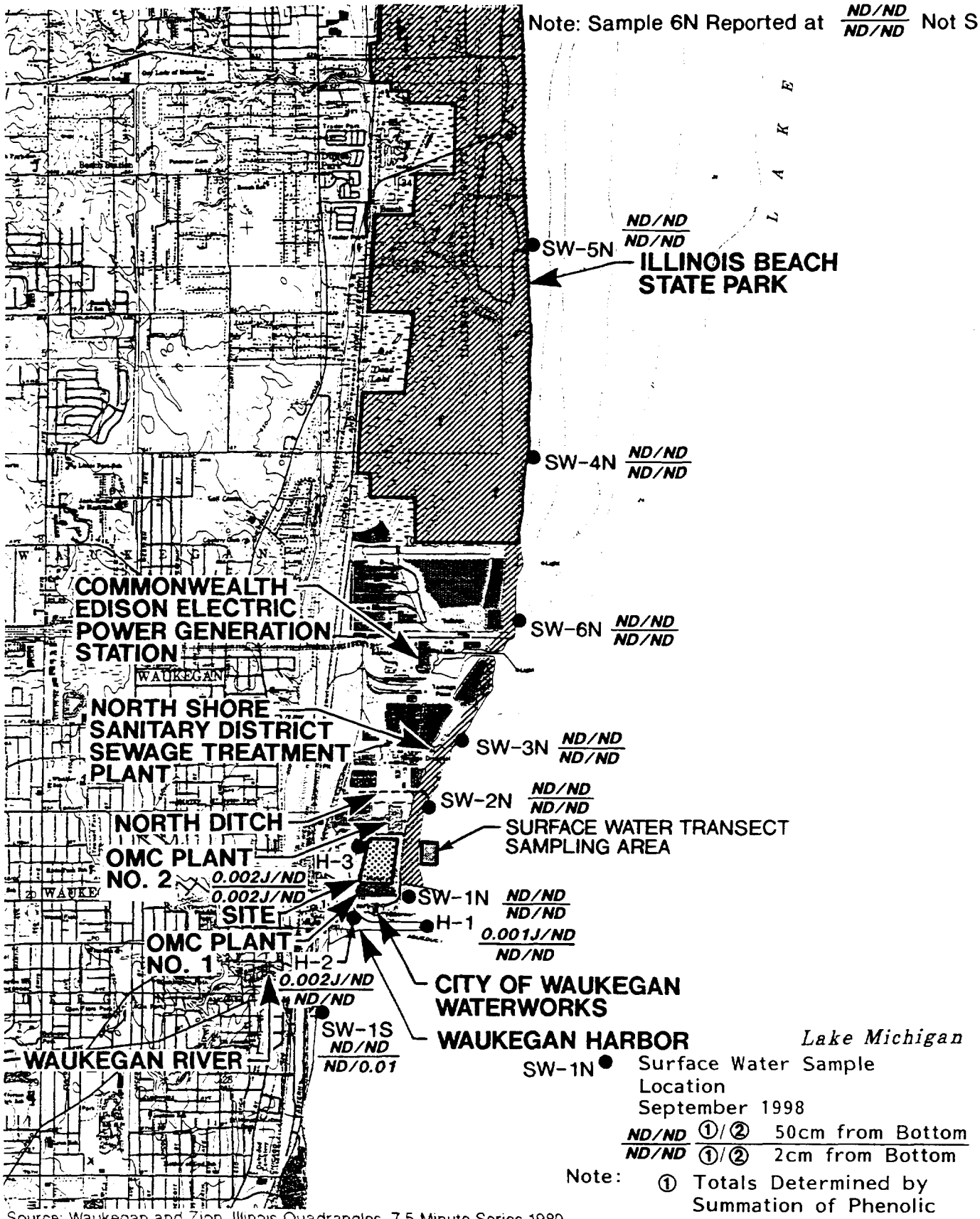


Figure 3

TOTAL PHENOLS CONCENTRATIONS IN SURFACE WATER
(Concentrations in mg/L)
Waukegan Manufactured Gas & Coke Plant Site

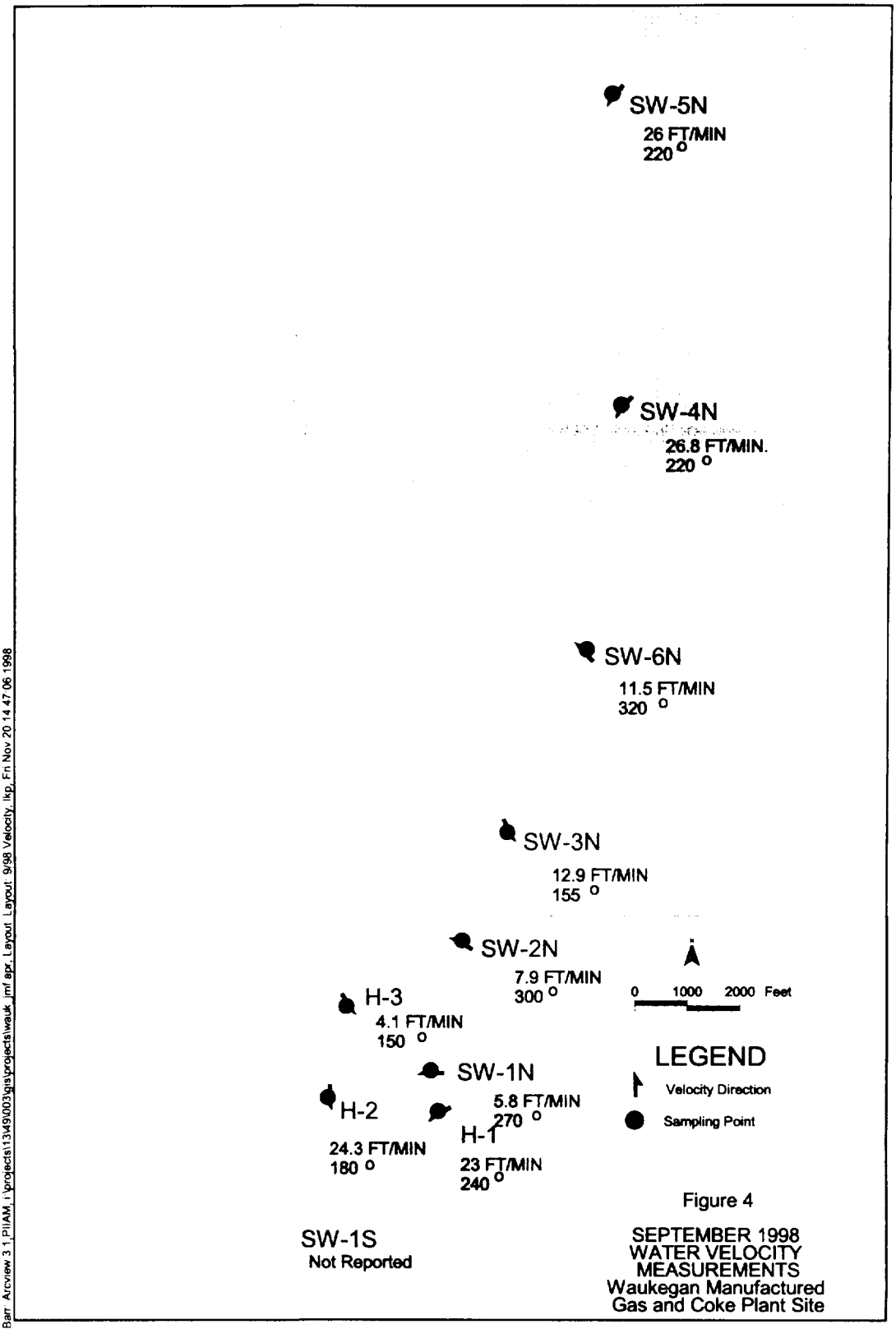


Figure 4

SEPTEMBER 1998
WATER VELOCITY
MEASUREMENTS
Waukegan Manufactured
Gas and Coke Plant Site

Barr Arcview 3.1,PlotAM, i:\projects\13x49\003\gis\projects\wauk_jmf.apr, Layout: Layout 9/98 Velocity, lkp, Fri Nov 20 14:47:06 1998

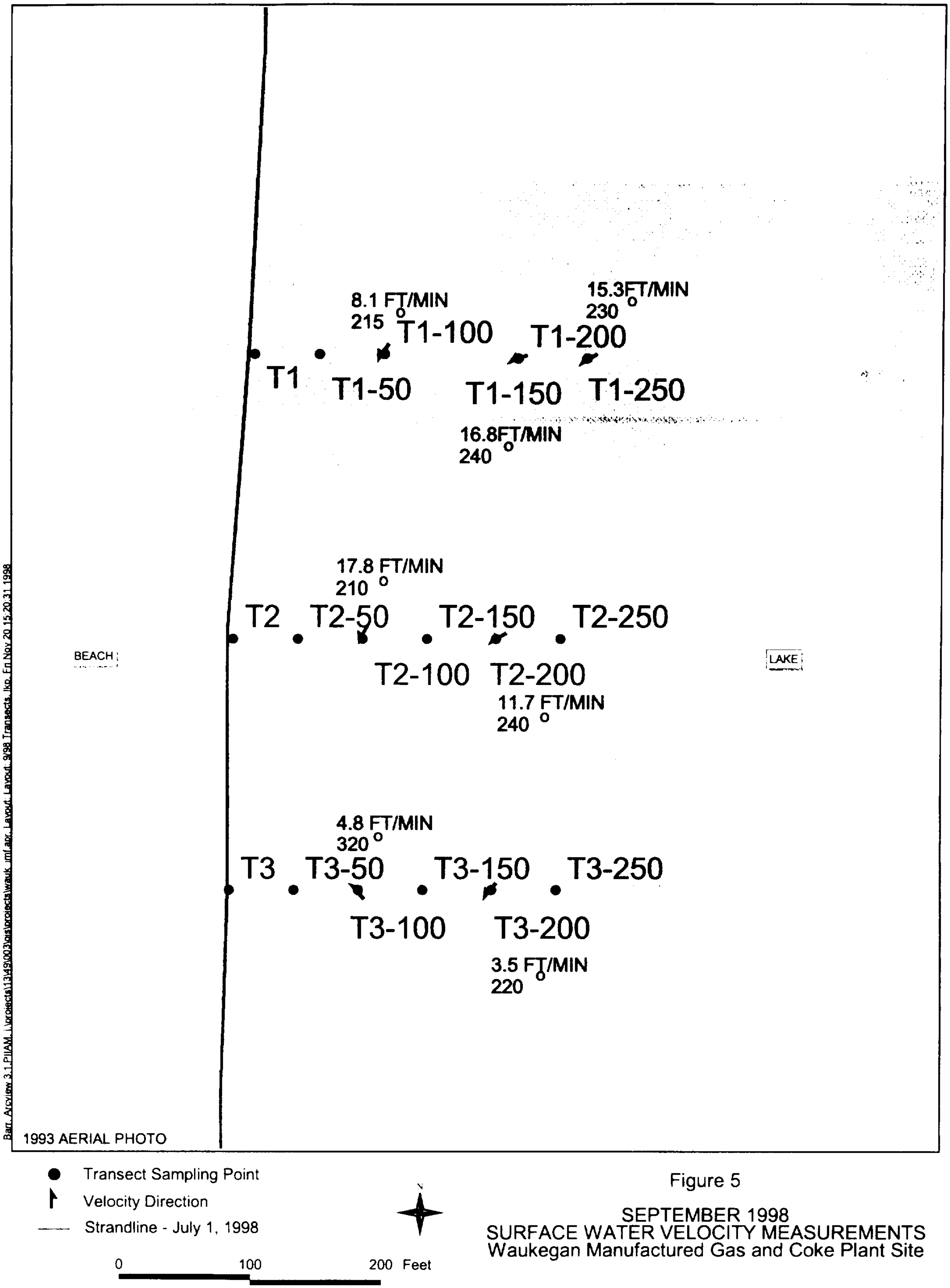
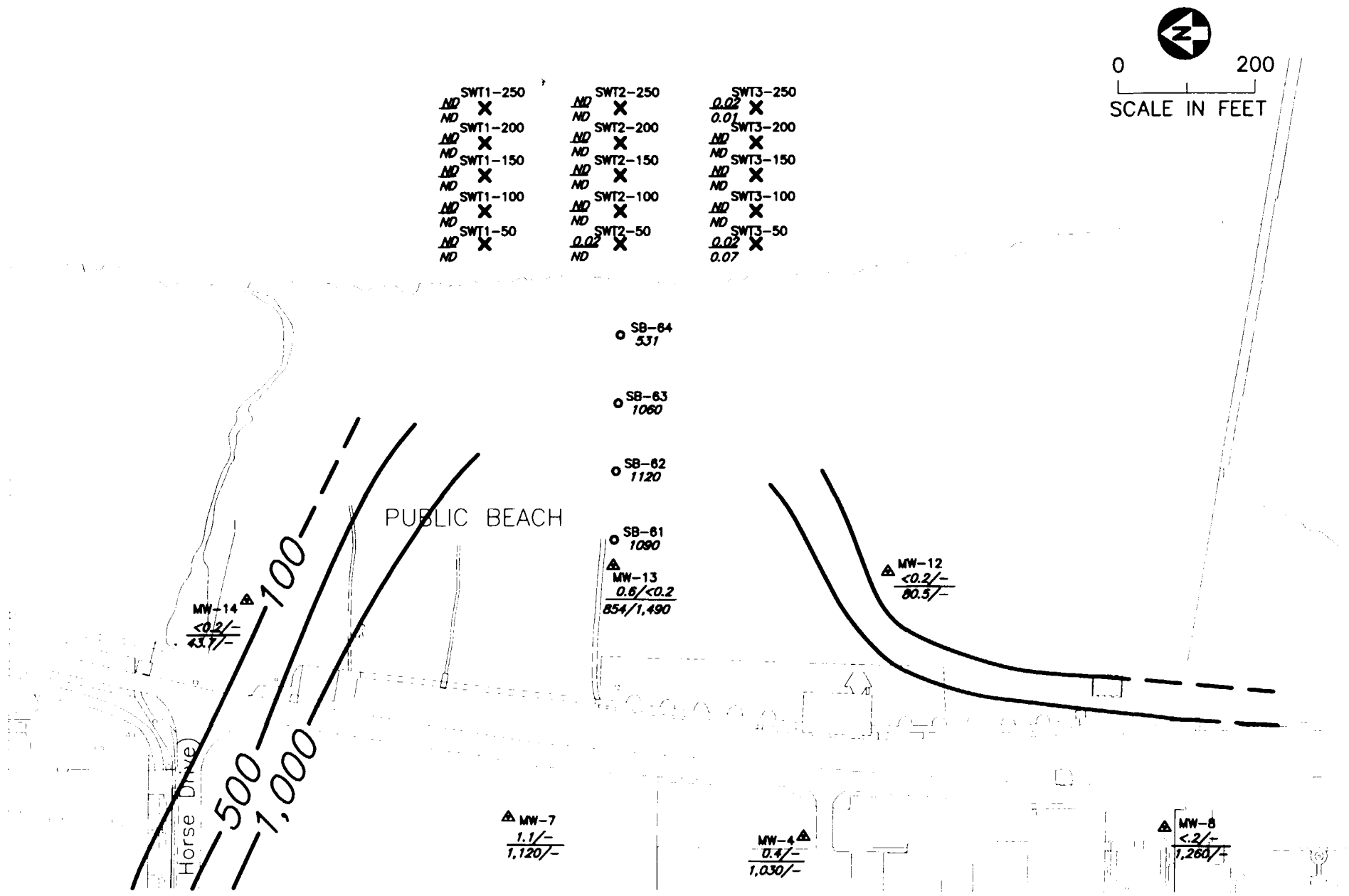


Figure 5

SEPTEMBER 1998
SURFACE WATER VELOCITY MEASUREMENTS
Waukegan Manufactured Gas and Coke Plant Site



PVJ 9764_1.DWG 400.00 11/12/1998 14.52.53

△ Monitoring Well Nest

0.6/<0.2 Top Of Aquifer 1996/1997
854/1,490 Base Of Aquifer 1996/1997

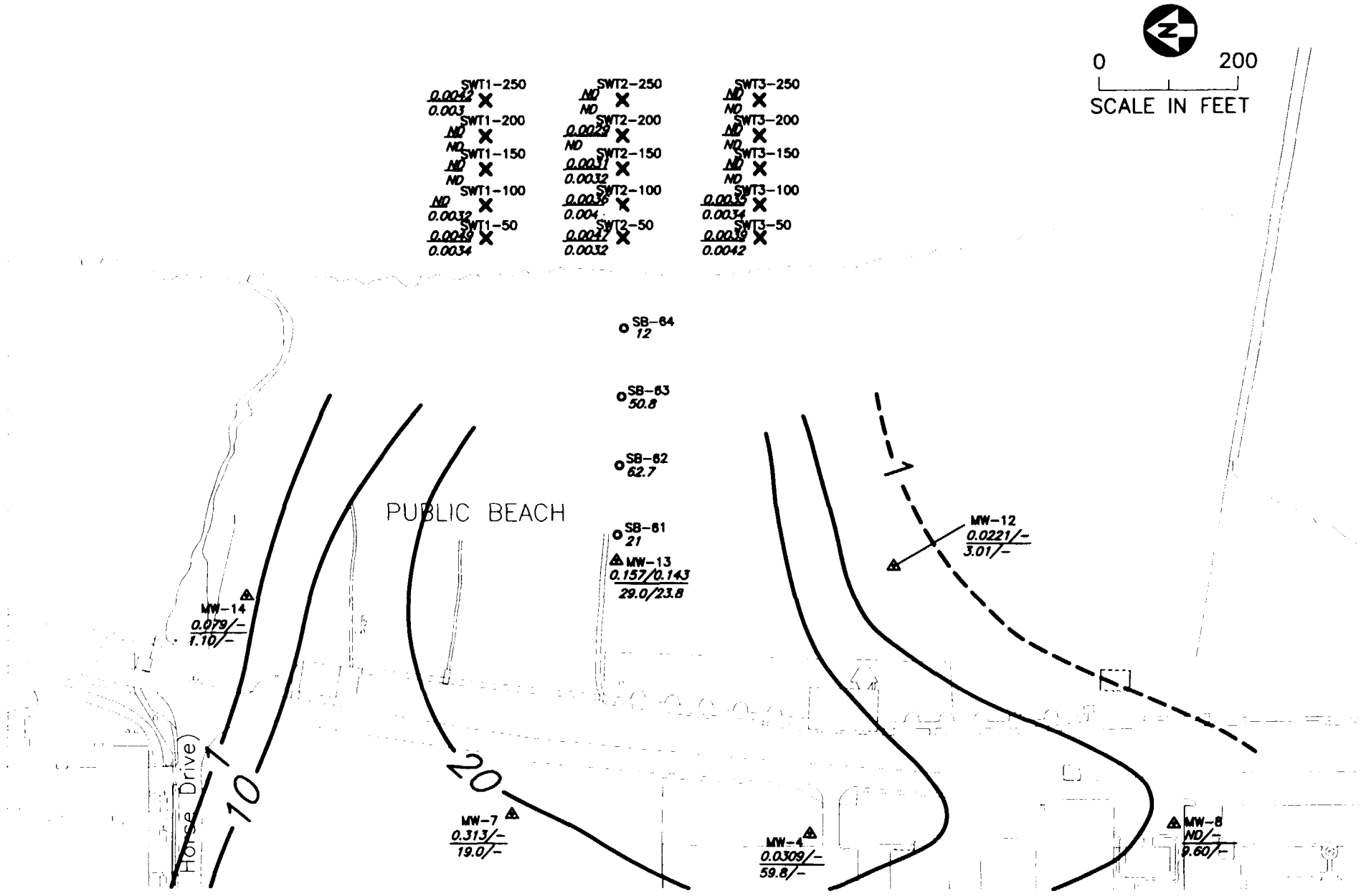
○ 1997 Hydropunch Sample
Base Of Aquifer Sample

× Surface Water Sample Location
September 1998

ND 50cm From Bottom
ND 2cm From Bottom

NOTE: CONTOURS TAKEN FROM FS REPORT

Figure 6
AMMONIA CONCENTRATIONS IN GROUNDWATER
AND SURFACE WATER
(Concentrations In mg/L)
Waukegan Manufactured Gas And Coke Plant



PVJ 9763_1.DWG 200.00 11/12/1998 12:57:05

△ Monitoring Well Nest

0.157/0.143 Top Of Aquifer 1996/1997
29.0/23.8 Base Of Aquifer 1996/1997

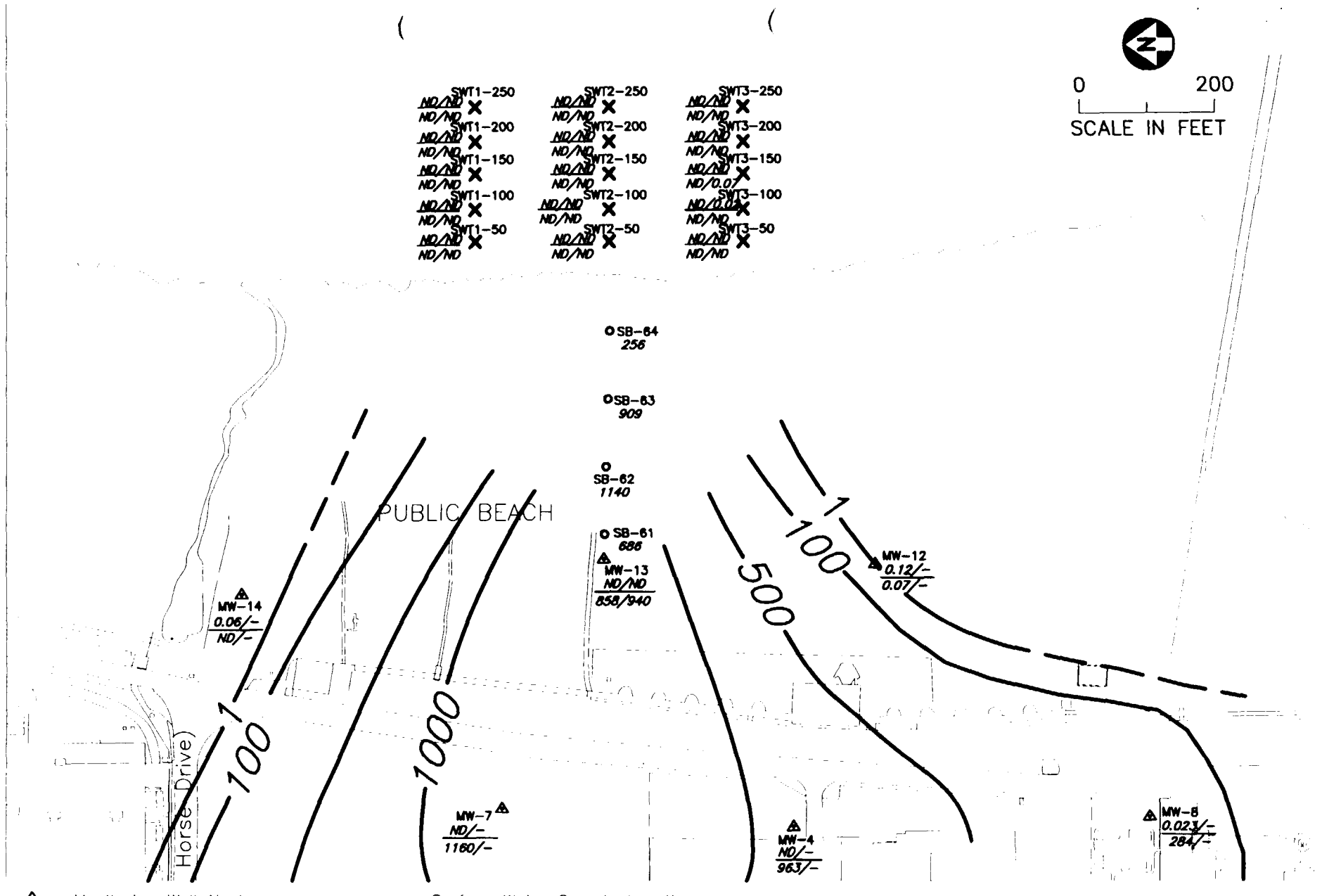
○ 1997 Hydropunch Sample
Base Of Aquifer Sample

× Surface Water Sample Location
September 1998

ND 50cm From Bottom
ND 2cm From Bottom

NOTE: CONTOURS TAKEN FROM FS REPORT

Figure 7
TOTAL ARSENIC CONCENTRATIONS IN GROUNDWA
AND SURFACE WATER
(Concentrations In mg/L)
Waukegan Manufactured Gas And Coke Plant



PVJ 9762_1.DWG 400.00 11/12/1998 12:38:26

△ Monitoring Well Nest

ND/ND Top Of Aquifer 1996/1997
858/940 Base Of Aquifer 1996/1997

○ 1997 Hydropunch Sample
Base Of Aquifer Sample

NOTE: CONTOURS TAKEN FROM FS REPORT

× Surface Water Sample Location
September 1998

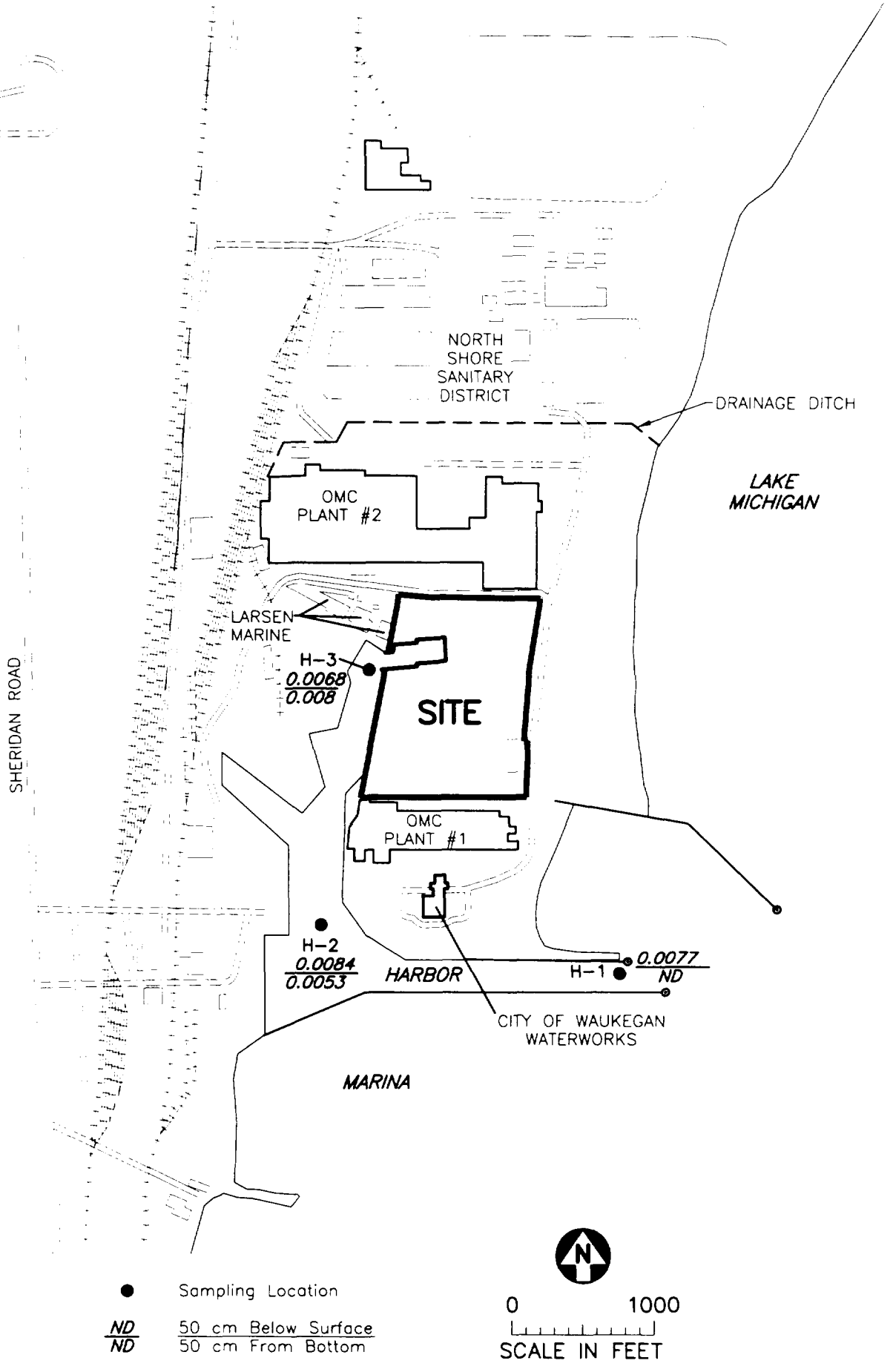
ND ①/② 50cm From Bottom
ND ①/② 2cm From Bottom

NOTES:

① Totals Determined By Summation Of Phenolic Compounds By Method 8270.

② Totals Determined By 4AAP Analytical Method.

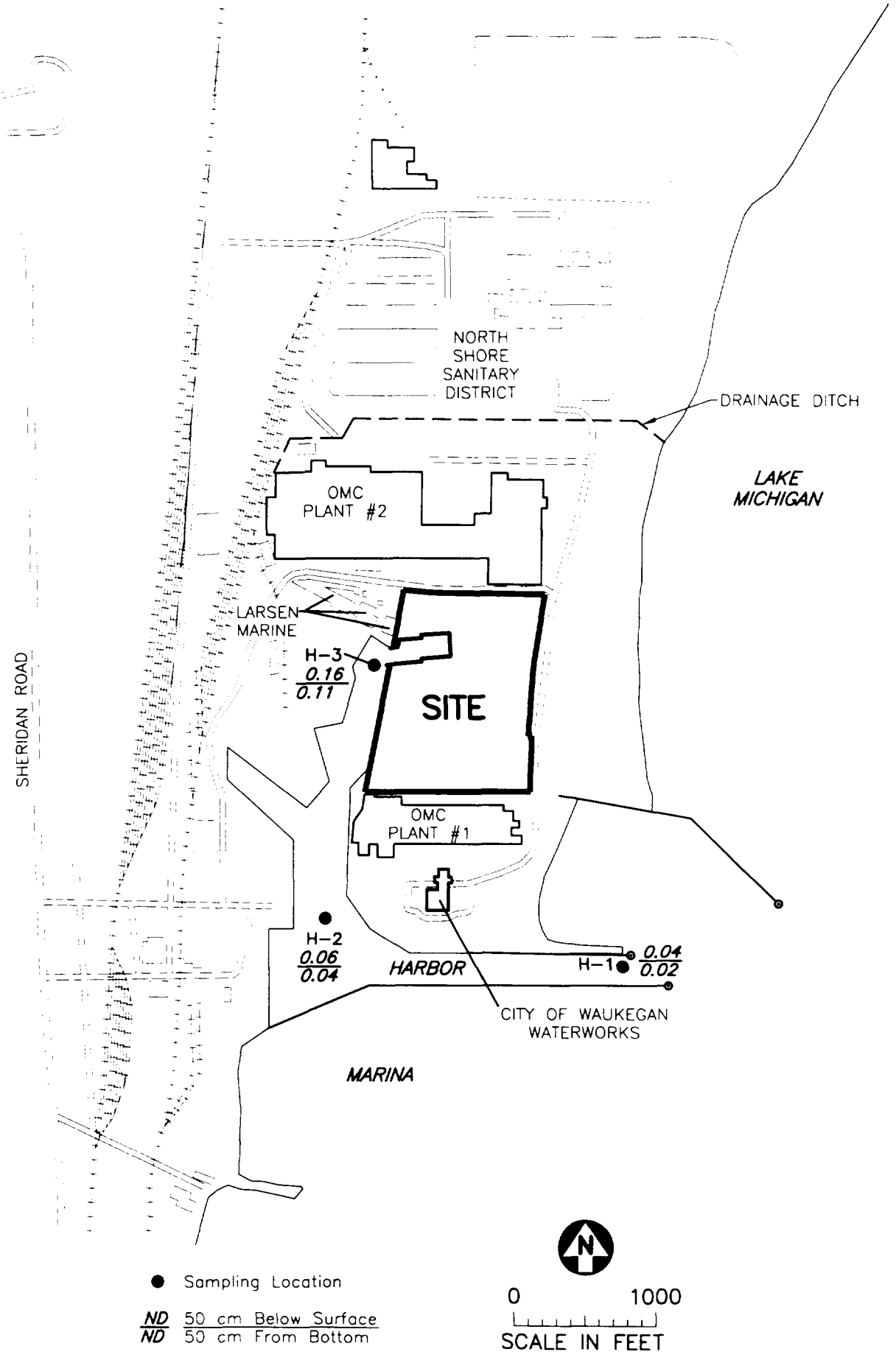
Figure 8
TOTAL PHENOLS CONCENTRATIONS IN GROUNDWATE AND SURFACE WATER
(Concentrations In mg/L)
Waukegan Manufactured Gas And Coke Plant



PVJ 9765_1.DWG 1000.00 11/12/1998 15:03:39

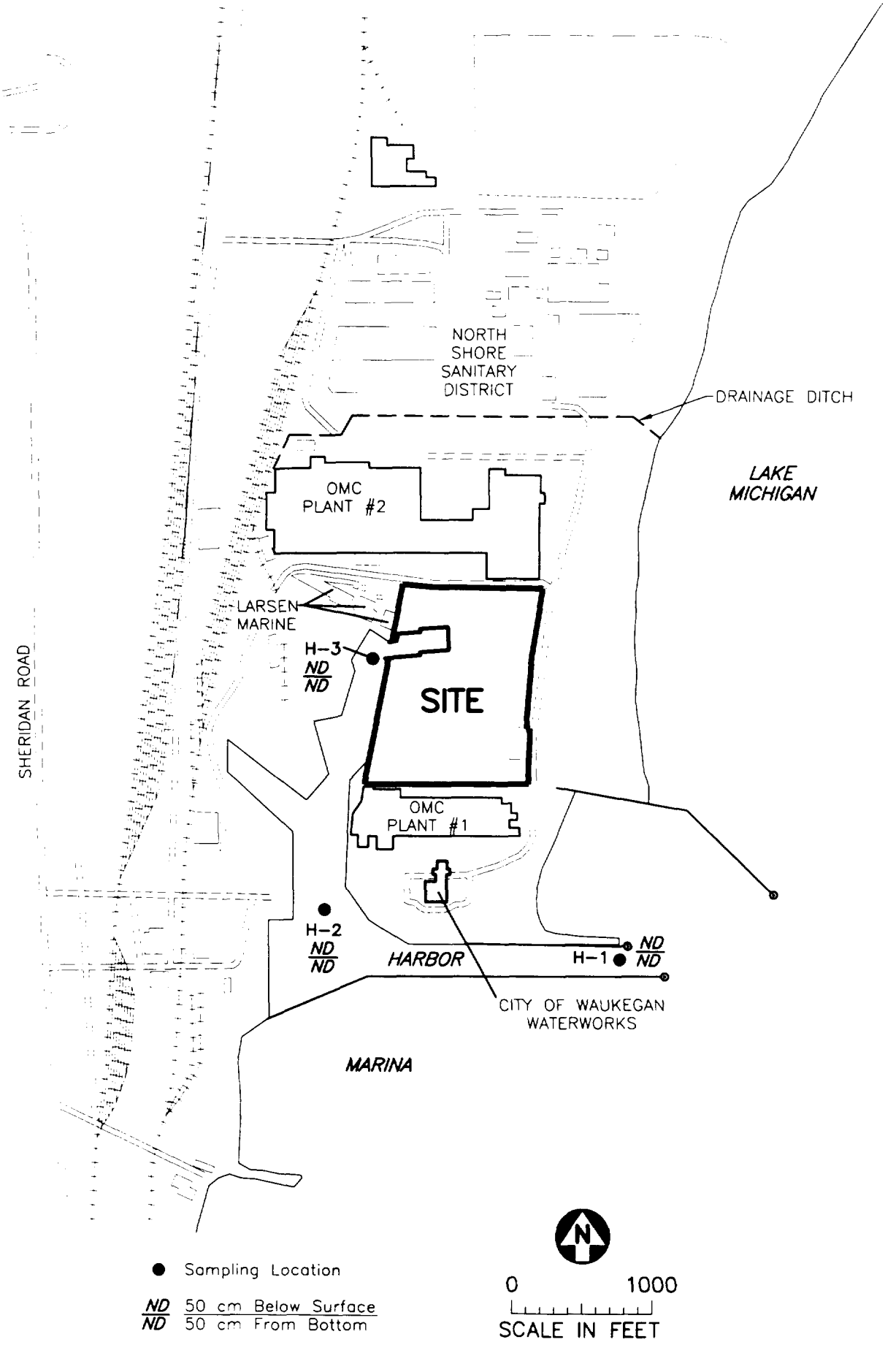
Figure 9

BENZENE CONCENTRATIONS
SEPTEMBER 1998 SURFACE WATER SAMPLES – HARBOR
(Concentrations In mg/L)



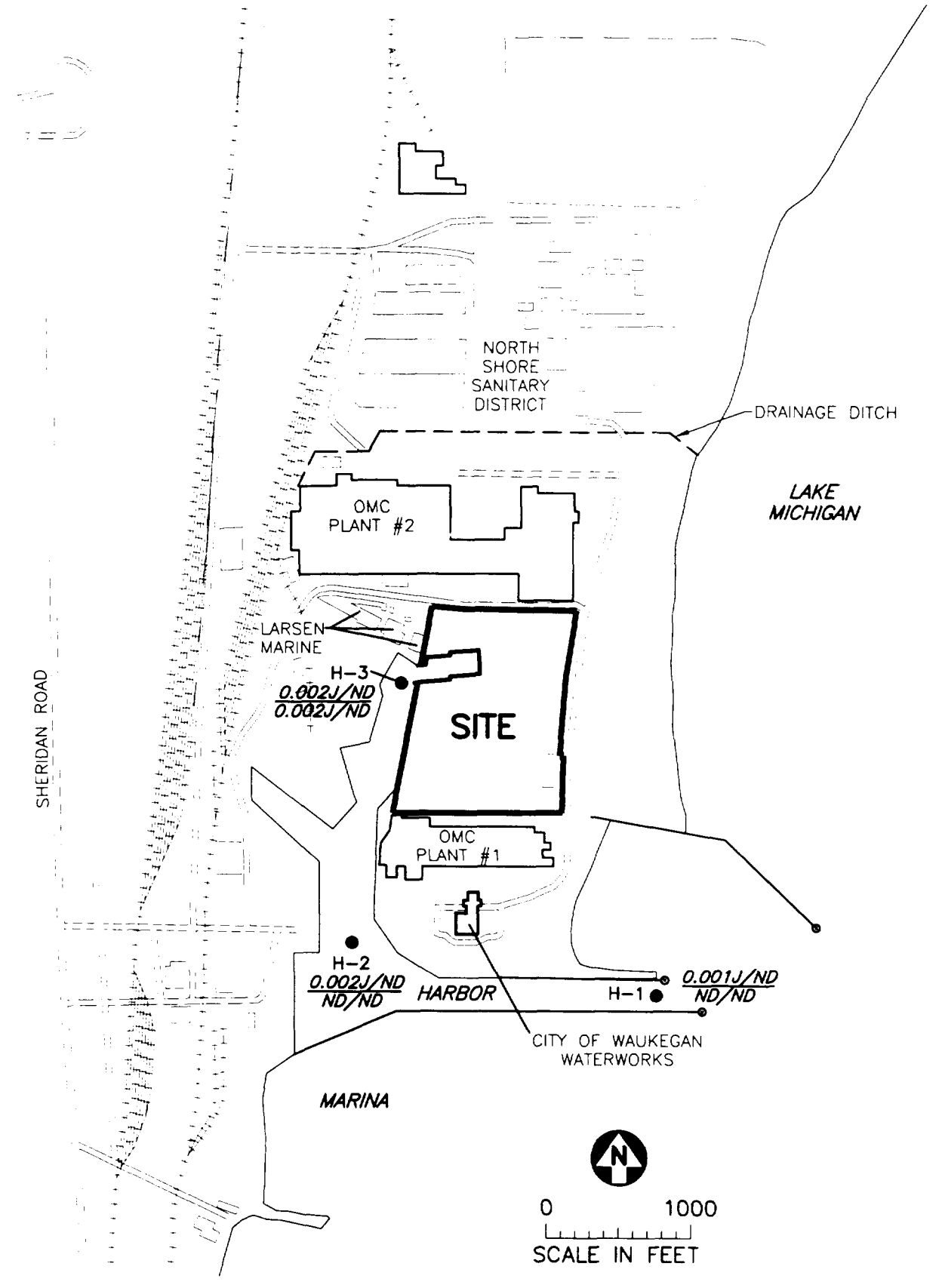
PVJ 9766_1.DWG 1000.00 11/12/1998 15:09:22

Figure 10
AMMONIA CONCENTRATIONS
SEPTEMBER 1998 SURFACE WATER SAMPLES – HARBOR
(Concentrations In mg/L)



PVJ 9767_1.DWG 1000.00 11/12/1998 15:13:45

Figure 11
ARSENIC CONCENTRATIONS
SEPTEMBER 1998 SURFACE WATER SAMPLES – HARBOR
(Concentrations In mg/L)



PVJ 9768_1.DWG 1000.00 11/12/1998 15:21:55

● Sampling Location

ND/ND ①/② 50 cm Below Surface
ND/ND ①/② 50 cm From Bottom

① Totals Determined By Summation Of Phenolic Compounds By Method 8270

② Totals Determined By 4AAP Analytical Method

Figure 12
TOTAL PHENOLS CONCENTRATIONS
SEPTEMBER 1998 SURFACE WATER SAMPLES – HARBOR
(Concentrations In mg/L)